



**Better Buildings Residential Network
Peer Exchange Call Series:**
*TRANSFORMATION: Technology that Can Change
the Residential Energy Efficiency World*
October 8, 2020

Agenda and Ground Rules

- Agenda Review and Ground Rules
- Opening Poll
- Residential Network Overview and Upcoming Call Schedule
- Featured Speakers:
 - **Karma Sawyer**, U.S. Department of Energy
 - **Curtis Harrington**, Western Cooling Efficiency Center
 - **Dave Bohac**, Center for Energy and Environment
 - **Eric Wilson**, National Renewable Energy Laboratory
- Open Discussion
- Closing Poll and Announcements

Ground Rules:

1. **Sales of services and commercial messages are not appropriate** during Peer Exchange Calls.
2. Calls are a safe place for discussion; **please do not attribute information to individuals** on the call.

The views expressed by speakers are their own, and do not reflect those of the Dept. of Energy.

Better Buildings Residential Network

Join the Network

Member Benefits:

- Recognition in media and publications
- Speaking opportunities
- Updates on latest trends
- Voluntary member initiatives
- One-on-One brainstorming conversations

Commitment:

- Members only need to provide *one number*: their organization's number of residential energy upgrades per year, or equivalent.

Upcoming Calls (2nd & 4th Thursdays):

- Oct 22: Zero Energy Goals and Residential Energy Efficiency – How Are They Fitting Together?
- Nov 12: Conversations with Utility Commissions, Efficiency Programs, and Homeowners – Translating Building Science to the Real World
- Dec 10: A Review of the Historic Past Year in Energy Efficiency

Peer Exchange Call summaries are posted on the Better Buildings [website](#) a few weeks after the call

For more information or to join, for no cost, email bbresidentialnetwork@ee.doe.gov, or go to energy.gov/eere/bbrn & click Join



Karma Sawyer
U.S. Department of Energy

TRANSFORMATION: Technology that Can Change Residential Energy Efficiency

Better Buildings Residential Network

Dr. Karma Sawyer

Emerging Technologies Program Manager, DOE Building Technologies Office

October 8, 2020



Our Homes and Buildings

The U.S. building stock is comprised of more than 123 million commercial buildings and housing units totaling 324 billion square feet.

More than 80% of structures are at least 20 years old.

Source: U.S. Energy Information Administration (CBECS 2012/RECS 2015); NAREIT Reits by the Numbers; Census Bureau Quarterly Retail E-Commerce Sales 4th Quarter 2016



5.5 million commercial buildings totaling 87 billion square feet



118.2 million housing units totaling 237.4 billion square feet



37% of homes & buildings produce rental income for their owners



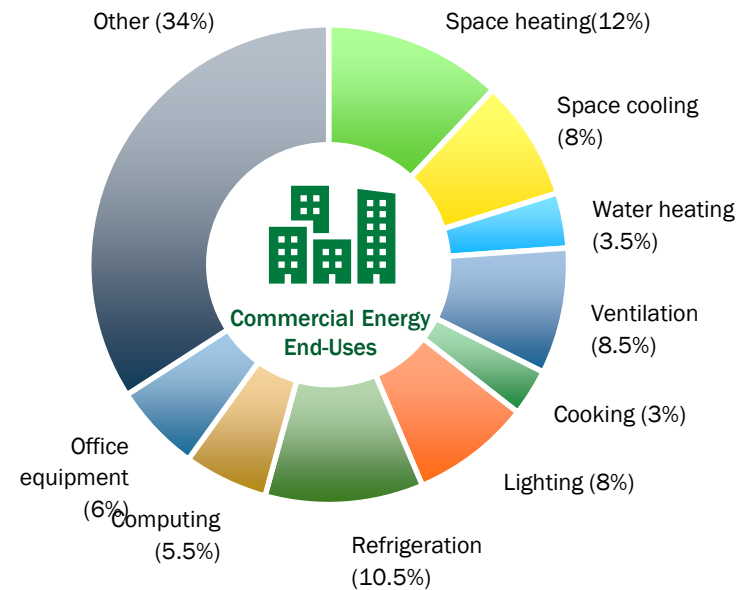
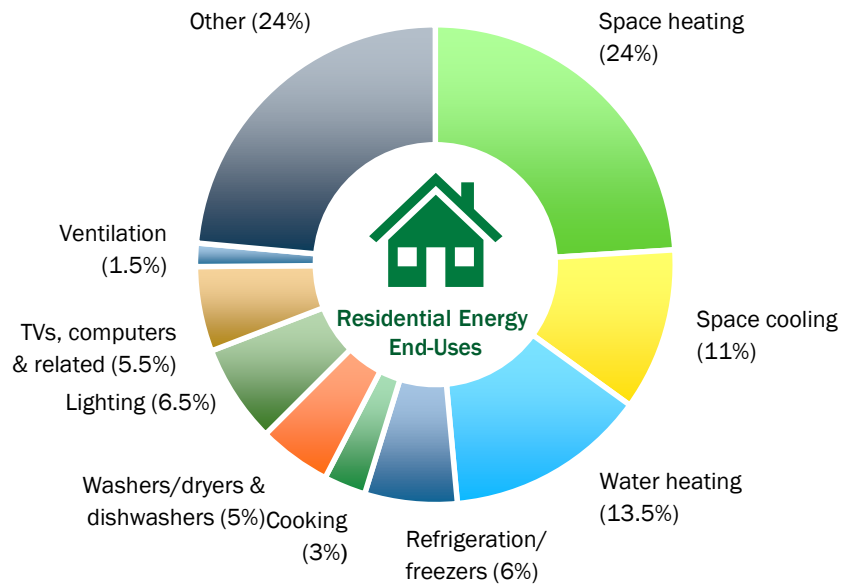
80 million Americans are invested in real estate through retirement and investment funds



Buildings' energy bill is **~\$380 billion** annually, much of which is wasted

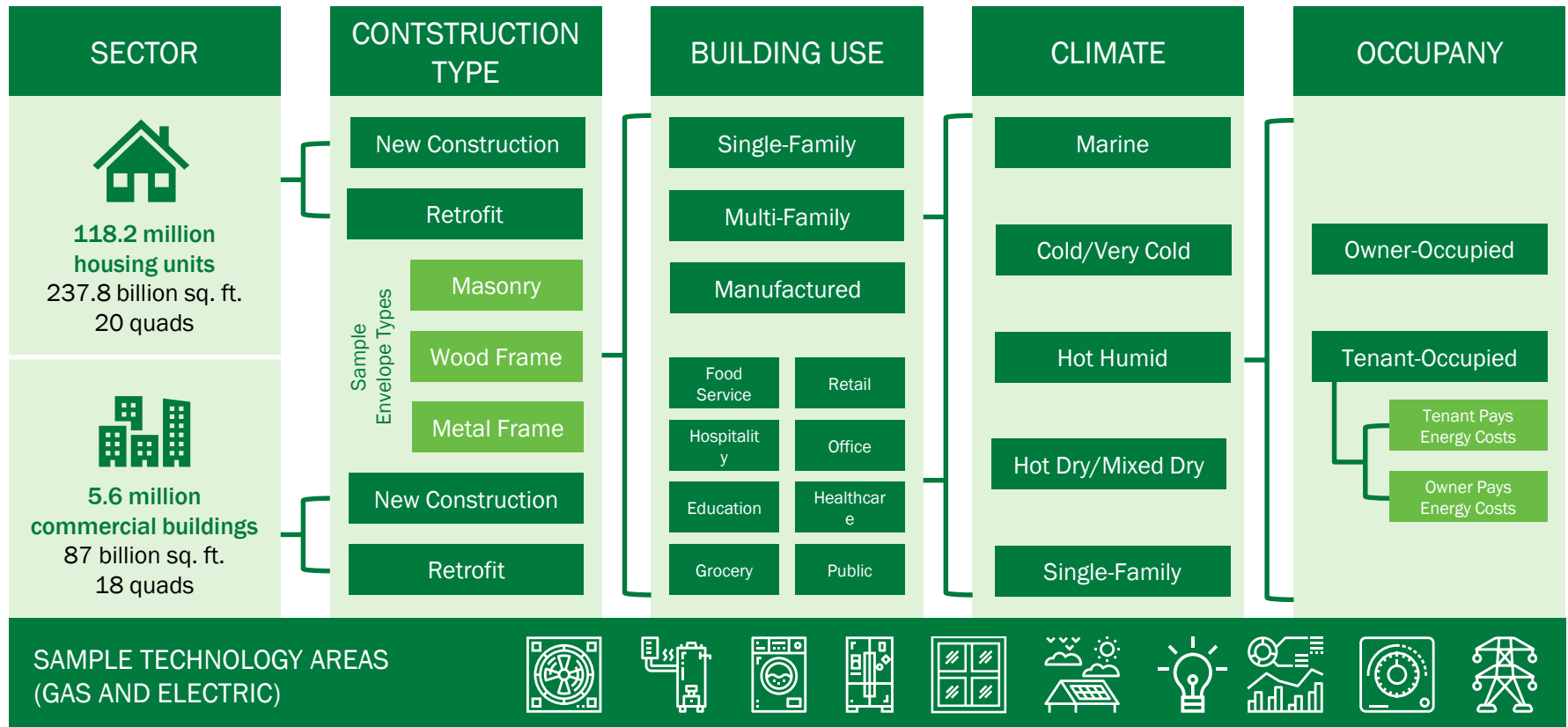
Our Homes and Buildings

We consume energy in our homes and buildings in many ways, ranging from appliances, lighting, and mechanical equipment to personal electronics.



Source: U.S. Energy Information Administration AEO 2018

Complexity of Energy Use in the Buildings Market



Our Approach

We lead R&D on technologies that make our homes and buildings more affordable and comfortable, and make America more sustainable, secure, and prosperous.

Our investments strengthen America's \$68 billion building energy efficiency marketplace.

Source: AEE Advanced Energy Now 2017 Market Report



R&D

Pre-competitive, early-stage investment in next-gen technology

Integration

Technology validation, field & lab testing, decision tools, market integration

Codes & Standards

Codes & standards development and technical analysis, standards promulgation

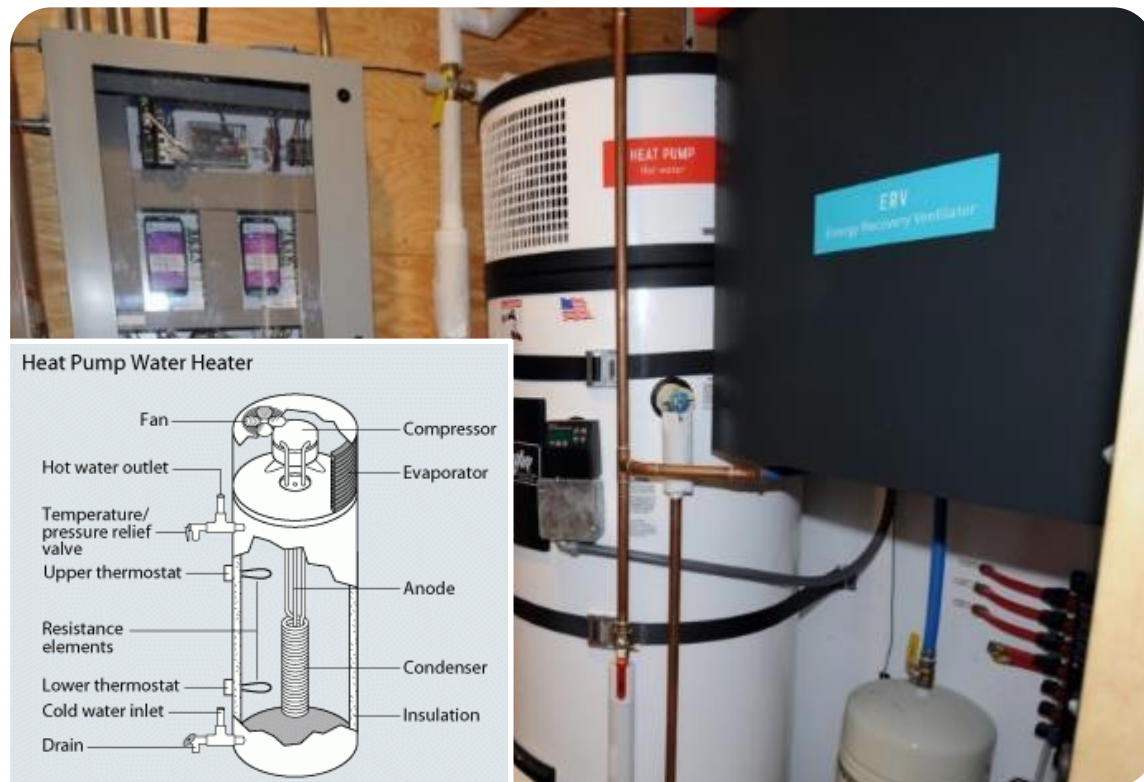


Heat Pump Water Heaters

Achieving Significant Peak Reduction and Energy Savings

Heat Pump Water Heaters

- Water heating is the second-largest energy user in U.S. homes.
- Typical HPWH can save 60% of annual energy consumption
- Challenge: little market penetration in the past 10 years.



Residential CO2 Heat Pump Water Heater

Potential Impacts

- Carbon dioxide (CO2) heat pump water heater (HPWH) that meets ENERGY STAR® standards for HPWHs at an installed cost that will enable widespread acceptance in the U.S. residential market.
- Cost-effective CO2 HPWHs could reduce energy use by 0.8 quads a year





R10 Windows Technology

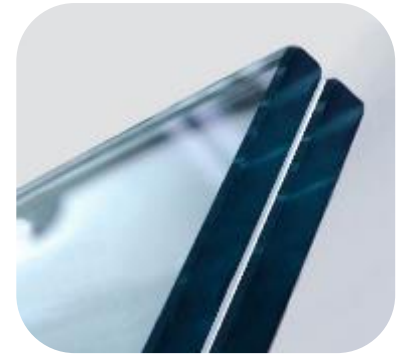
Window Transformational Impacts on Buildings



Highly Insulating R10 Windows with Dynamic Solar Control Buildings Become Energy Positive in Most Climates

Buildings use less energy than if there were not any windows

- **Vacuum Glazings**
 - Improve glass strengthening
 - Edge design with least thermal shorts
 - Low conductivity spacers
 - Designed for high volume production
- **Aerogels and other transparent insulating materials**
 - Low haze requirements
 - Fast processing
 - Withstand handling and structural requirements



Vacuum Glazing



Aerogel

Dynamic Solar Control

- **Electrochromic windows have been commercialized but barriers remain**
 - Much lower cost production
 - New material development to avoid thick expensive sputtering times
 - Fast switching speed
 - Maintain proven durability per ASTM 2141 compliance
 - New innovative technology could offer electricity generation and solar control
 - Ultimate glazing will allow for independent control of visible and near infrared light modulation



Window Metrics and Targets by Technology

							Primary Energy Savings (quads)	
Building Sector		Performance		Installed Price Premium		2030	2050	
Highly Insulating Windows	Residential	13	R-value	2.9	\$/ft² window area	1.28	1.07	
	Commercial	10		8.5		0.93	0.72	
Dynamic Windows	Residential	0.05/0.65	SHGC (active/inactive)	2.9	\$/ft² window area	1.35	1.5	
	Commercial			15		1.56	1.64	
Daylighting	Commercial	40%	Lighting energy savings	13	\$/ft² window area	0.26	0.17	

Windows Research and Development Opportunities Report (DRAFT)

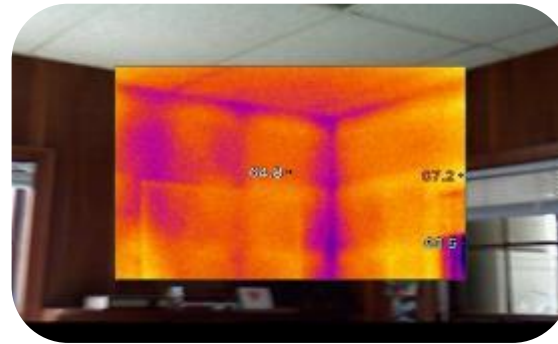
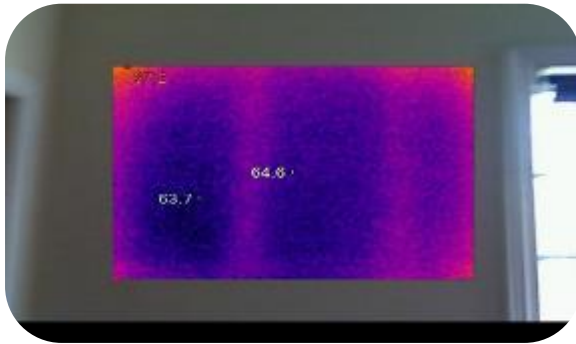
<https://www.energy.gov/eere/buildings/downloads/research-and-development-opportunities-report-windows>



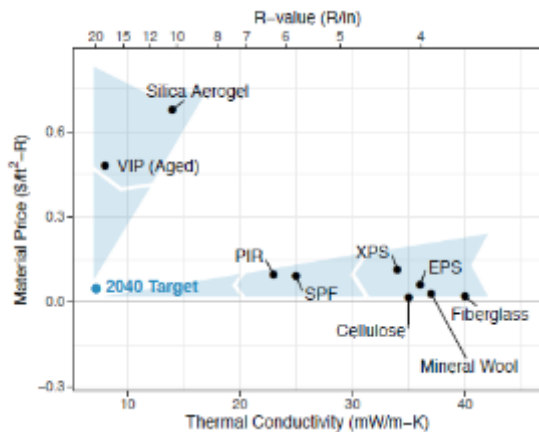
Advanced Insulation

Retrofit Challenges

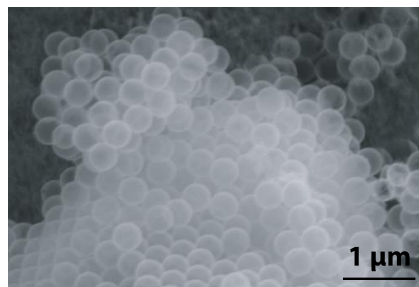
Current retrofit approaches don't cut it



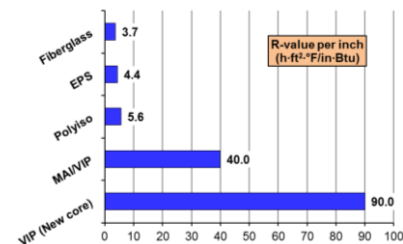
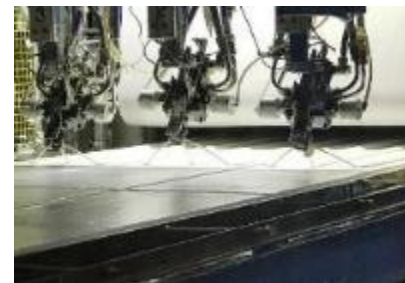
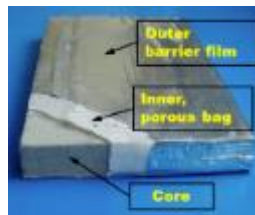
Insulation Materials with High-R/in



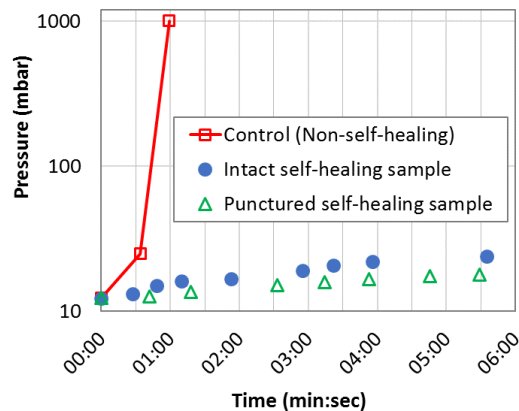
Hollow Silica Particles
Target R9-10/in



Vacuum Insulated Panels (VIPs)

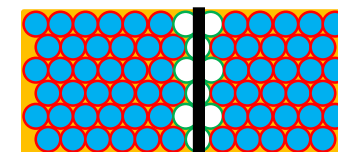


Self-Healing Film for VIPs



Evacuated Spheres

Target $\geq R14/\text{in}$

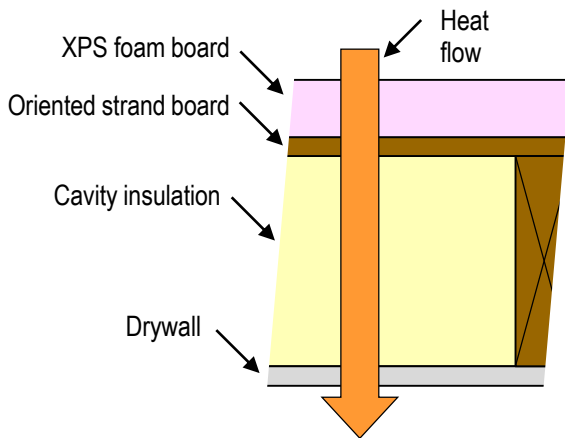


Fastener
Not drawn to scale

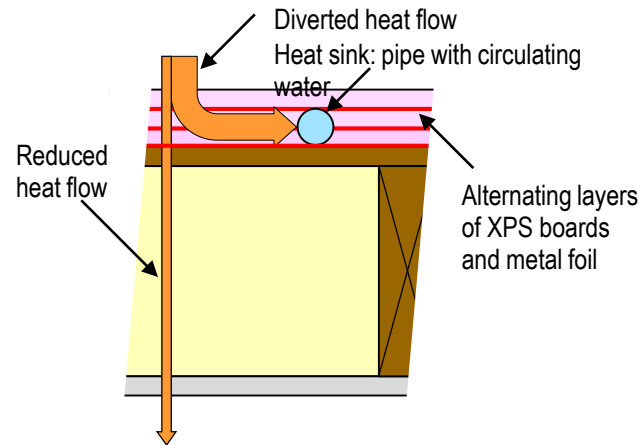
- Evacuated hollow sphere
- Spherical air/vapor barrier
- Damaged barrier
- Sphere at ambient pressure
- Binder

Anisotropic Thermal Management for Building Envelopes

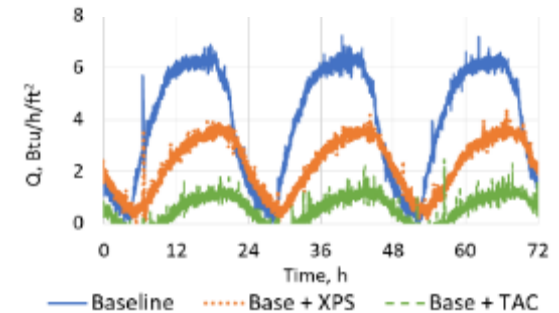
Typical wall – plan view



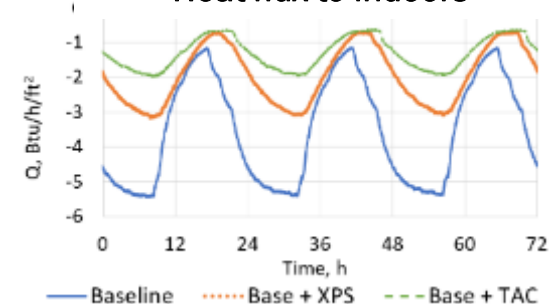
Wall with thermally anisotropic composite and heat sink – plan view



Summer - Phoenix, AZ
Heat flux to indoors



Winter - Baltimore, MD
Heat flux to indoors





Light at Night

Understanding the Impacts of Light at Night

DOE-funded research into sky glow, blue light, and the biological effects of light at night help to clarify the science and dispel confusion.

- Study explored LED street lighting impact on sky glow
- IES Sky Glow Technical Memorandum (in balloting) offers recommendations for reducing human contributions to lighting in the night sky, methods to estimate effectiveness of options



Understanding the Impacts of Light at Night

PILOT STUDY



Home Nighttime Light Exposures

How much are we really getting in our residences?

BY NAOMI J. MILLER AND BRUCE R. KINZEY

An investigation into residential light exposure at night was prompted by the publication of an American Medical Association (AMA) report on LED street lighting in June 2009, and subsequent citations and responses by both the professional and mainstream press. The report raised fears that exposure to light at night from LED streetlights may contribute to a variety of potential health concerns, such as circadian disruption and insomnia, and possibly related issues like increased obesity and even cancer. Both the DOE and the EIS published statements challenging the AMA's statements concerning the impact of LED streetlights on human circadian systems, and their recommended guidelines.

While the AMA document mentions various sources of light at night, from street lighting that filters through bedroom windows, to household interior lighting, to nightlights, to electronics such as TVs, tablets and cell phones, the recommendations are directed solely at street lighting. Nighttime light levels and spectral exposure data are scarce¹, hindering clear understanding of the relative risks posed by different light sources. The authors undertook this project in order to pursue additional information about the amount of light people receive from street lighting entering their homes relative to typical light exposure inside residences during the evening and nighttime hours.

Pacific Northwest National Laboratory (PNNL), through the U.S. Department of Energy's Solid-State Lighting program, explored this issue with a small pilot study to measure light reaching the eye in various residential locations, enlisting the help of people who already own light meters and the knowledge to use them: lighting professionals. This group was also able to identify the types of light sources found in and around their own homes, to adequately measure the illuminance they provide, and to characterize their basic color qualities. W&E

- Pilot study on home nighttime lighting exposure enlisted 30 lighting professionals to collect lighting data in their homes
- Key takeaways:
 - Light infiltration from streetlights has far less impact compared to interior lighting
 - Consider reducing light levels in home at night: increase use of dimming, use more task lighting and less ambient lighting, shut off or filter electronic screens
 - Consider using warmer-color bulbs (3000K or less)

<https://www.energy.gov/eere/ssl/street-lighting-blue-light-and-light-night>

Thank You!

Thank You!



Curtis Harrington
*Western Cooling
Efficiency Center*



Dave Bohacs
*Center for Energy and
Environment*



Aerosol Sealing of Existing Residences



Curtis Harrington

Senior Engineer

Western Cooling Efficiency Center

csharrington@ucdavis.edu



Dave Bohac

Director of Research

Center for Energy and Environment

dbohac@mncee.org

Challenge

High performance moisture managed envelopes require more effective air barriers

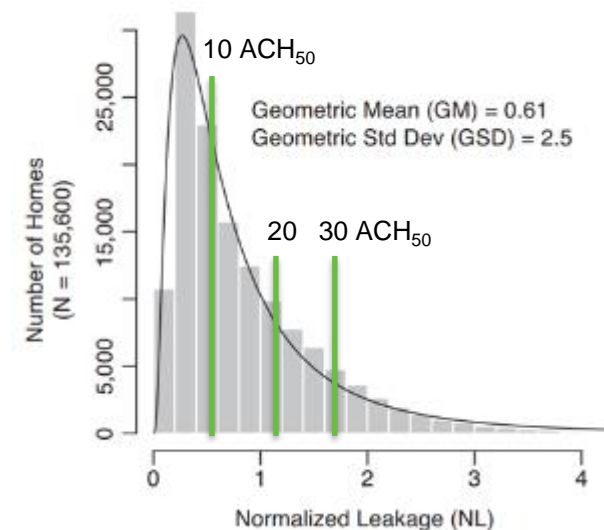
U.S. residential building sector = 23% of U.S. energy use¹

- Space conditioning = 9.5 quads or 43% of that
- Air infiltration is responsible for about 30%

Standard construction has produced leaky houses – 135,000 houses in the LBNL ResDB database had a geometric mean leakage of about 11 ACH₅₀².

Recent requirements for tighter envelopes.

- IECC 2012/15/18: 3 – 5 ACH₅₀
- DOE Zero Energy Ready: 2 – 3 ACH₅₀



Tight envelopes can be achieved with current sealing methods

- Current methods require additional cost, time, quality control, and crew training
- Reliable method is needed for consistently tight envelopes

1. "Windows and Building Envelope Research and Development: Roadmap for Emerging Technologies," 2014. U. S. DOE

2. Chan, WR, Joh, J, and Sherman, M. "Analysis of air leakage measurements of US houses", 2013. Energy and Buildings

Health Benefits of Air Sealing

- Reduced transfer of contaminants and odor between multifamily units

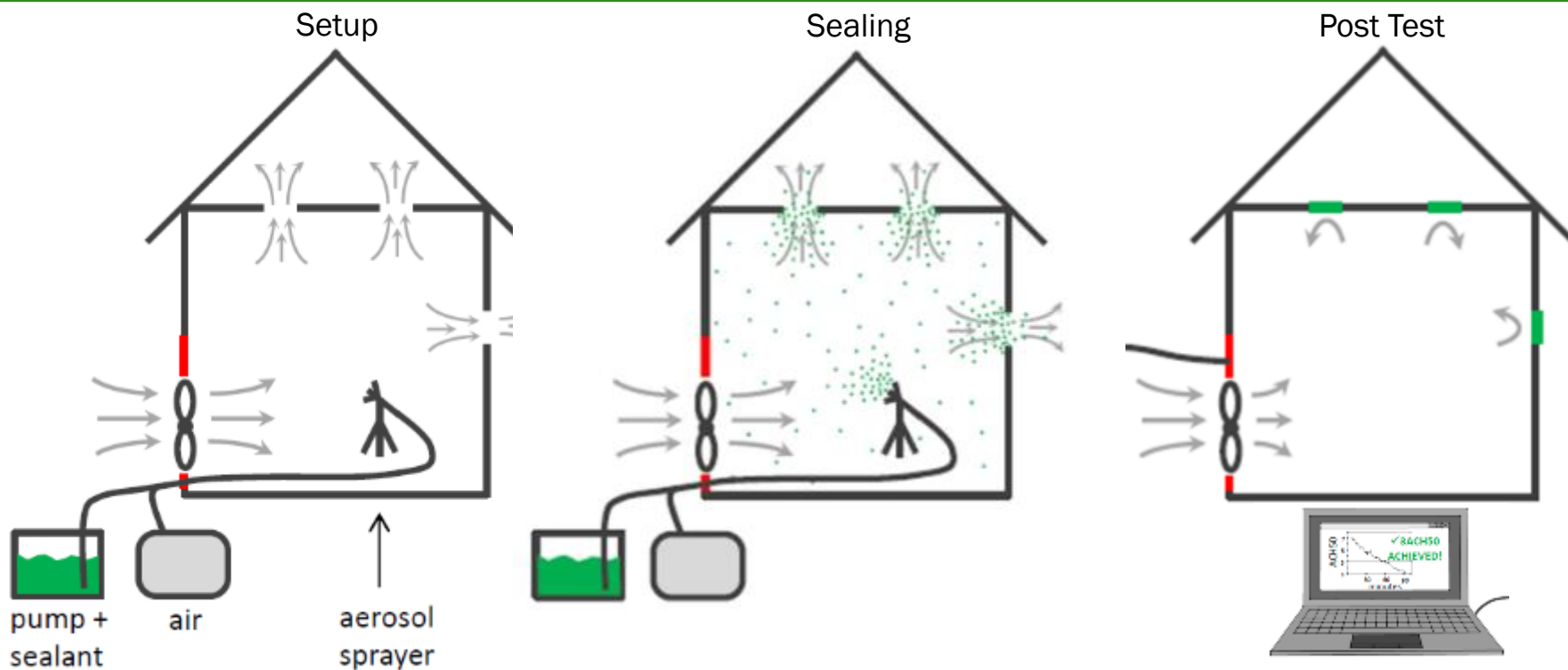


- Better control of air flow and reduced infiltration of outdoor air and outdoor pollutants (e.g. PM_{2.5} or Ozone)



- Facilitates use of Mechanical Ventilation
 - HRV or ERV and filters
 - Putting HRV/ERV on leaky building doesn't save energy or reduce uncontrolled infiltration

Approach



Bottom plate/sheathing gap



Missing foam



Penetrations

Center for Energy and Environment Partners

- University of California – Davis: Western Cooling Efficiency Center
- Building Knowledge, Inc.
- University of Minnesota Twin Cities: Cold Climate Housing Program
- AeroSeal, LLC

Topic Area

Moisture Managed High-R Envelopes

Success Metrics: Radically improve quality assurance of envelope sealing and significantly reduce labor costs compared to traditional air-sealing approaches.

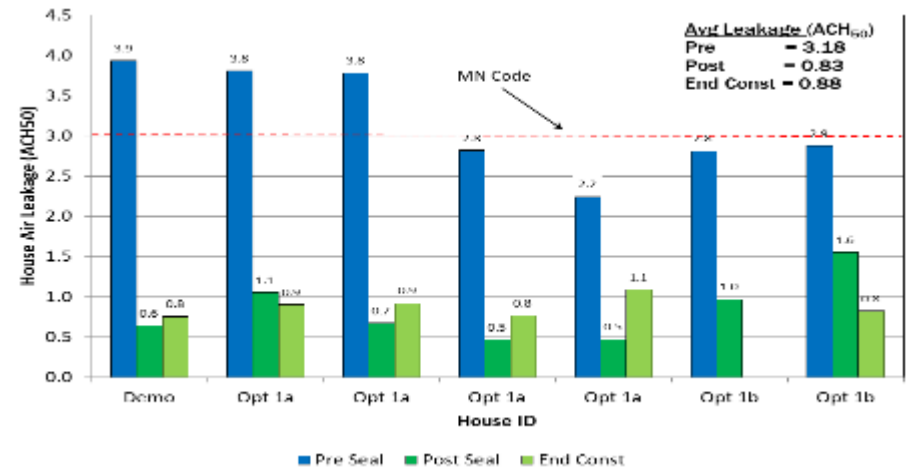
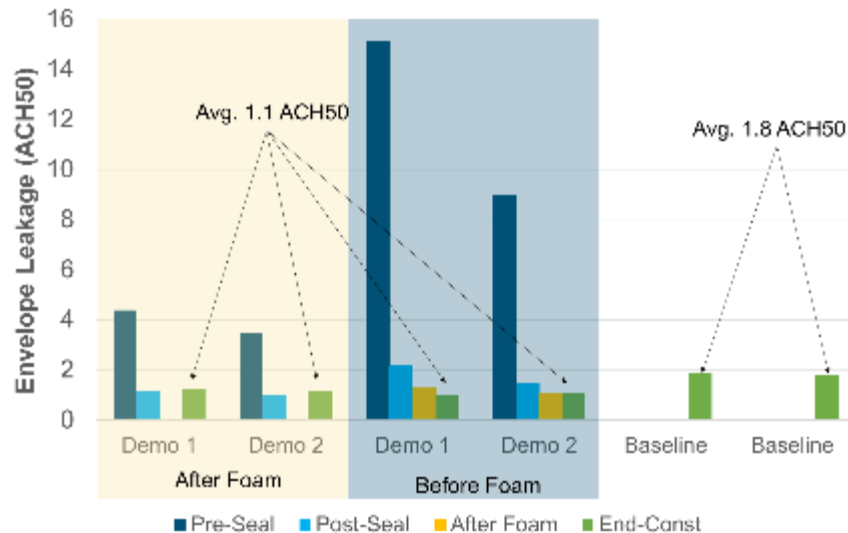
Previous Project: Aerosol Sealing in New Construction

- Simultaneously measures, locates, and seals leaks in a building remotely
- Evaluate several sealing approaches with multiple builders to establish procedures that builders can use to easily integrate the aerosol sealing technique into standard construction practices and reduce the cost of less-effective conventional sealing
- Produce more consistent sealing performance and improved air tightness in an economic manner.



Takeaways

- **Aerosol sealing was very effective**
 - Reduced air leakage by 75-80% & well below code
 - Seal any time after air barrier in place
- **Can replace many conventional sealing tasks**
- **Experienced crew can seal two houses per day**



Takeaways

- **California builders**
 - Aerosol sealing was more effective than open-cell foam
 - Sealing before drywall resulted in lower increases in leakage after sealing
- **Minnesota builders**
 - Production builders can achieve passive house tightness
 - Can seal during winter with little change in construction sequence
- **Multiple opportunities for application**
 - New code or program leakage requirement
 - Achieve higher performance house
 - Benefit from higher incentives or reduced HVAC system size

Center for Energy and Environment

Partners

- University of California – Davis: Western Cooling Efficiency Center
- AeroSeal, LLC

Topic Area

High Performance Moisture
Managed Envelopes

Success Metrics: 35 home and MF unit study to adapt aerosol envelope sealing process to achieve 75% leakage reduction of existing residences.

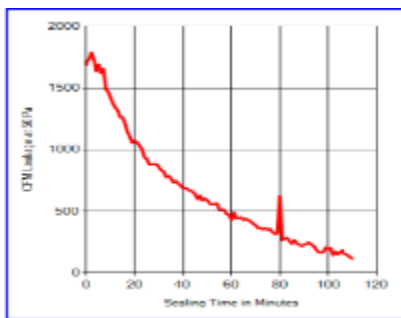
Current Project: Aerosol Sealing in Existing Residences

- **Process:** Sealant fog dispersed in pressurized house, sealing envelope gaps up to 3/8" wide, within 1 to 2 hours.
- **New Homes:** Provided 75% average leakage reduction and allowed production builders to achieve passive house tightness for half of their houses.
- **Previous Work:** Limited demonstrations for existing houses and multifamily units.
- **Challenges:**
 - Protect finished horizontal surfaces from sealant deposition
 - Identify and manually pre-seal leaks > 3/8" wide
 - Improve sealant to dry clearer and easier to clean
 - Demonstrate leakage reduction



Work Scope

- Seal 35+ existing houses and multifamily units in California and the Midwest.
- Apply to renovations, remodeling, additions, and occupancy changes.
- Work with housing authorities, affordable housing providers, remodelers, utility efficiency programs, and time of sales programs.
- Develop protocols for manual pre-sealing, surface protection, and aerosol sealing process.
- Improve sealant to dry clearer and easier to clean.
- Demonstrate leakage reductions and identify best applications. Goal for 75% reduction. How far to occupied houses can we go?



Old Equipment



New Equipment



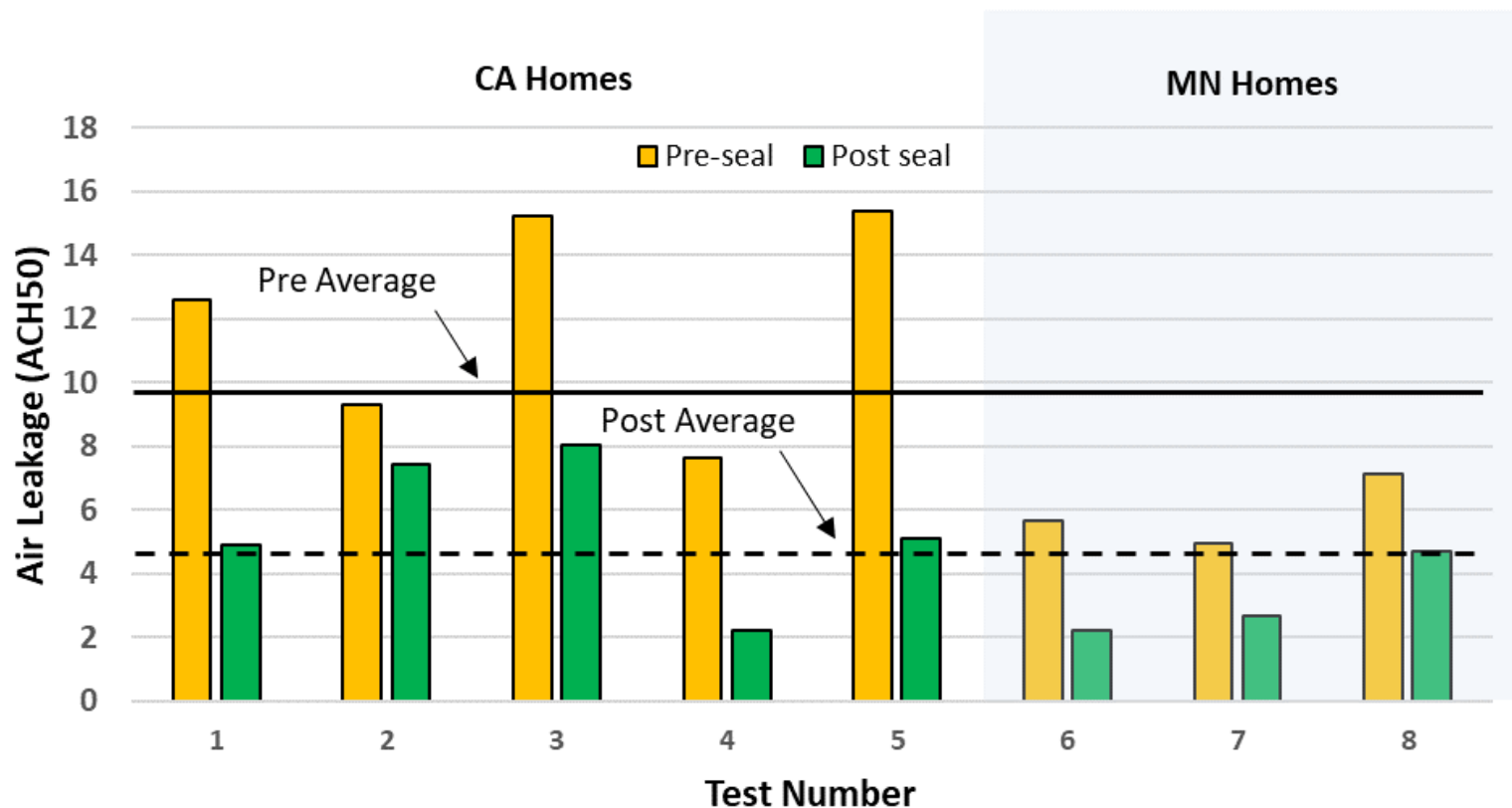
Wireless communications
with automated RH control



Fan/heater protected
from sealant



Preliminary Results

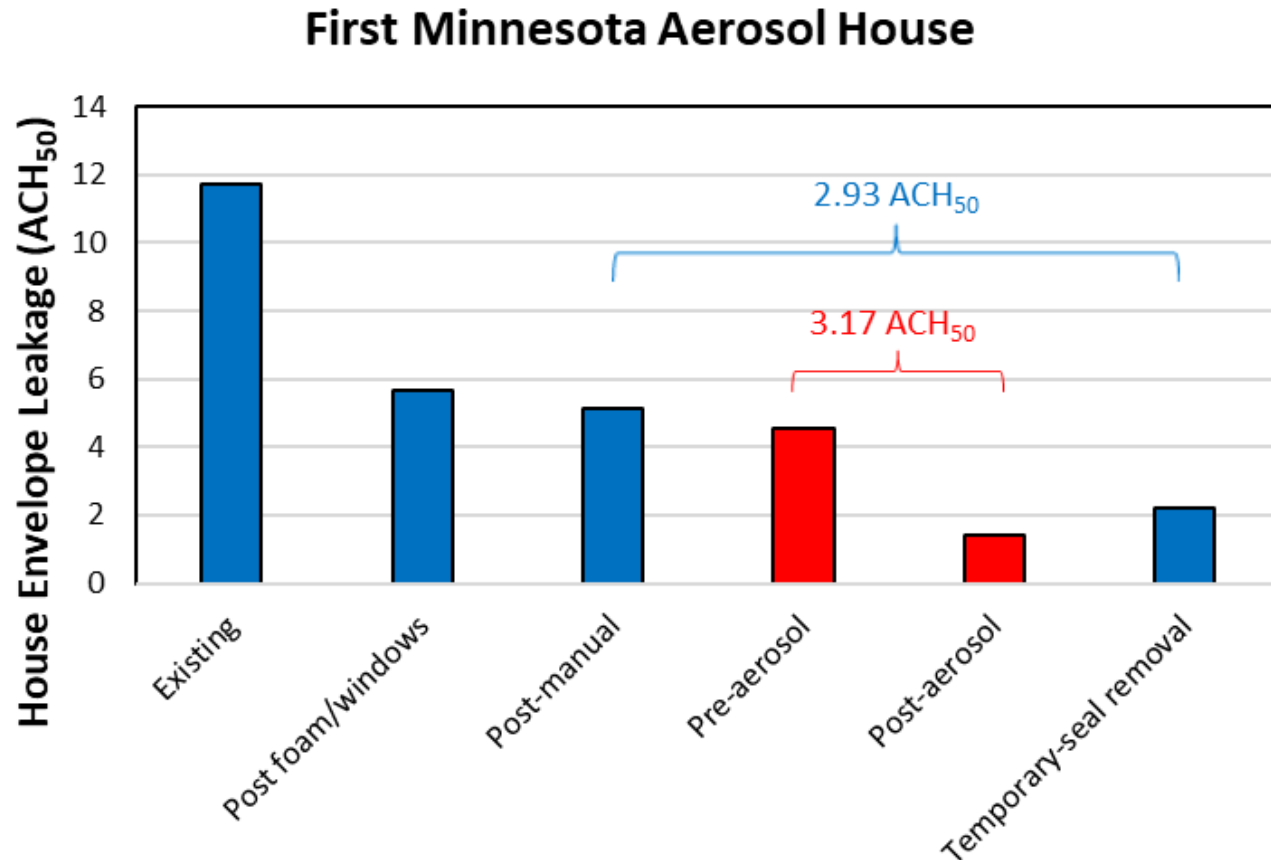


Average leakage: pre= 9.8 ACH50, post= 4.7 ACH50

Average leakage reduction of 53%

significant leakage covered by prep work

Preliminary Results



Some leakage covered by prep work
- How to minimize w/o large clean-up?

Sealing Prep

Prep



Aerosol Seals



Thank You



Curtis Harrington

Senior Engineer

Western Cooling Efficiency Center

csharrington@ucdavis.edu



Dave Bohac

Director of Research

Center for Energy and Environment

dbohac@mncee.org




Eric Wilson
National Renewable Energy Laboratory



ResStock Overview for Better Buildings Residential Network

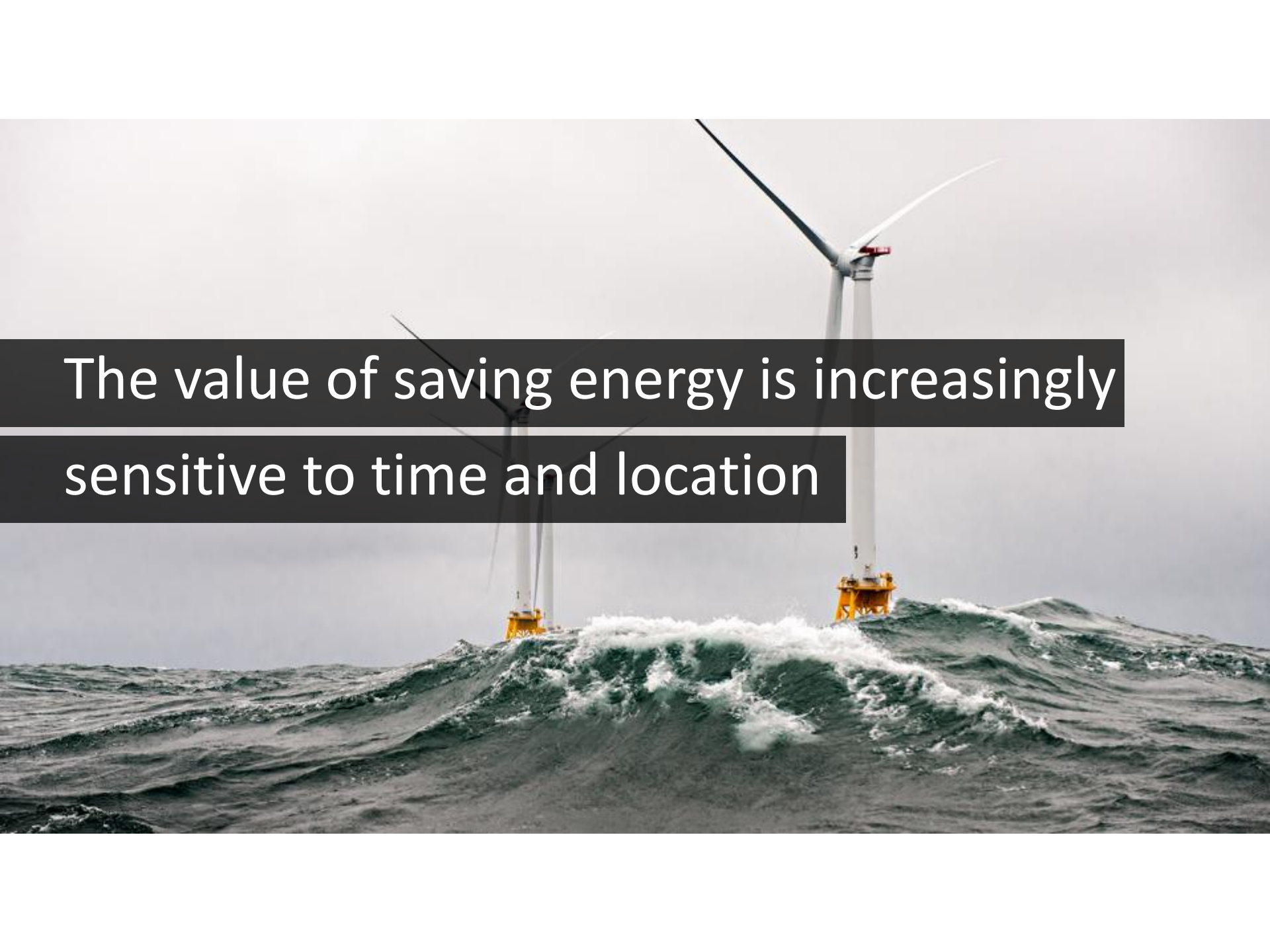
Peer Exchange Panel on “TRANSFORMATION: Technology that
Can Change the Residential Energy Efficiency World”

October 8, 2020
Eric Wilson, NREL

A close-up photograph of a green apple being squeezed in a dark, heavy-duty metal vise. The apple is cracked and deformed under the pressure. In the background, a pair of pliers with black and yellow handles is visible, and a wooden surface is partially seen. The scene is set against a plain, light-colored background.

The \$8B energy efficiency industry is feeling the squeeze¹

¹ Wemple, Cooper, and Hutson 2016

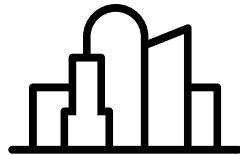
A photograph of two offshore wind turbines in a dark, stormy sea. The turbines are white with yellow bases. The sea is dark green with white-capped waves. The sky is overcast and grey. A dark grey text box is overlaid on the image.

The value of saving energy is increasingly
sensitive to time and location



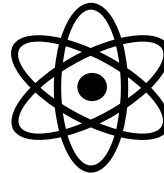
Highly granular analysis tool
for national, regional, and local housing stocks





Housing stock
characteristics
database

+

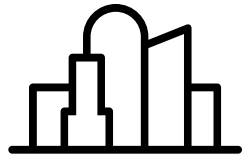


Physics-based
computer modeling

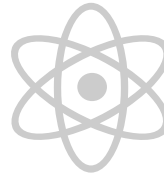
+



High-performance
computing



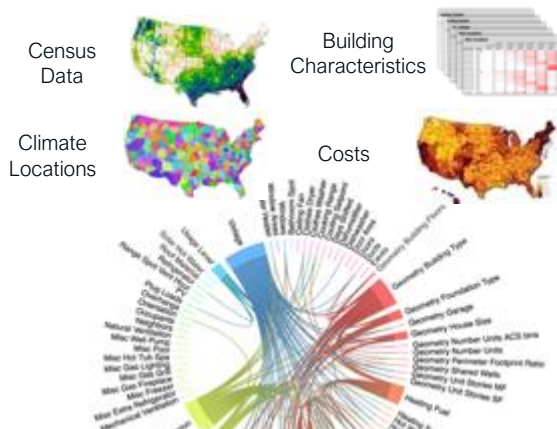
+



+



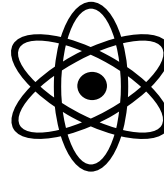
Large public and private datasets



6000 probability distributions for
100 parameters structured in a
dependency tree



Housing stock
characteristics
database

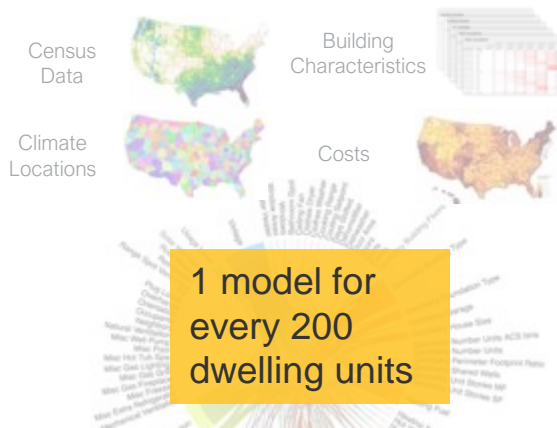


Physics-based
computer modeling



High-performance
computing

Large public and private datasets



6000 probability distributions for 100 parameters structured in a dependency tree

Open source DOE models

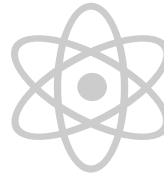


Detailed sub-hourly energy simulations





Housing stock
characteristics
database

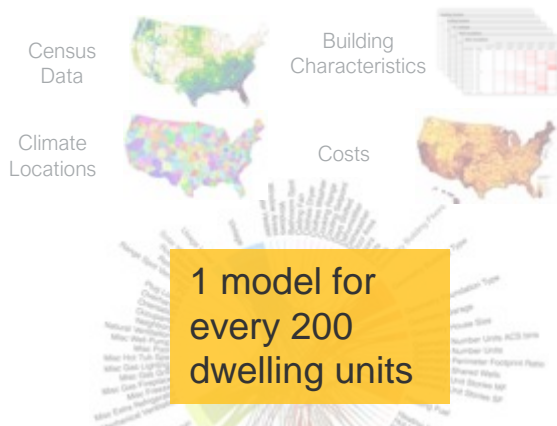


Physics-based
computer modeling



High-performance
computing

Large public and private datasets



6000 probability distributions for 100 parameters structured in a dependency tree

Open source DOE models



Detailed sub-hourly energy simulations



10,000s to 100,000s of simulations

NREL's
supercomputer



Cloud
computing



Big data technology stack



Current Paradigm: Deemed Savings

Modeled or measured
in small sample



\$100 annual savings



House icon by UNiCORN
from Noun Project (creative commons)

Current Paradigm: Deemed Savings

Modeled or measured
in small sample



\$100 annual savings



House icon by UNiCORN
from Noun Project (creative commons)

Reality Check

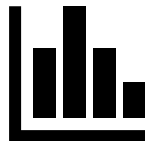
Modeled or measured
in small sample



\$100 annual savings



Real savings
values are
distributed



House icon by UNiCORN
from Noun Project (creative commons)

Reality Check

Modeled or measured
in small sample

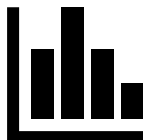


\$100 annual savings

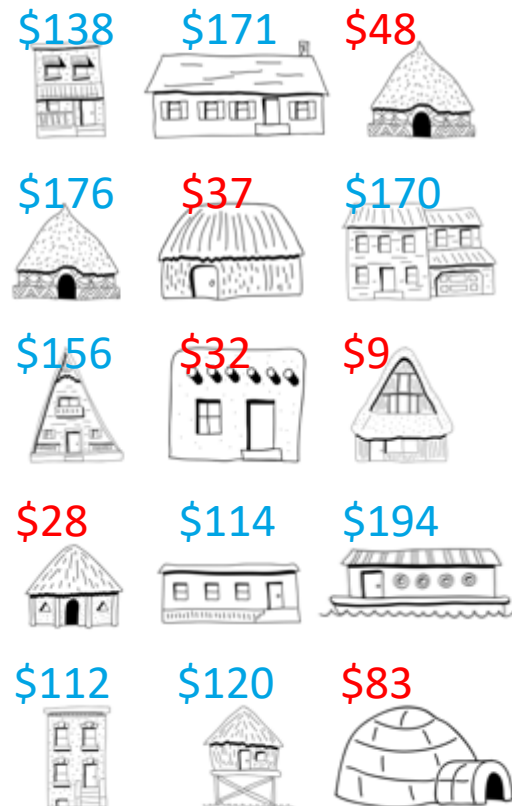


House icon by UNiCORN
from Noun Project (creative commons)

Real savings
values are
distributed

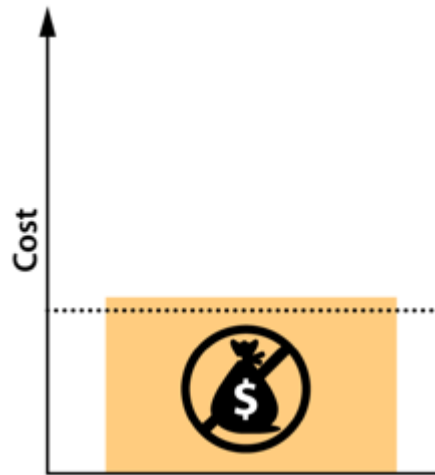


Real homes
are diverse



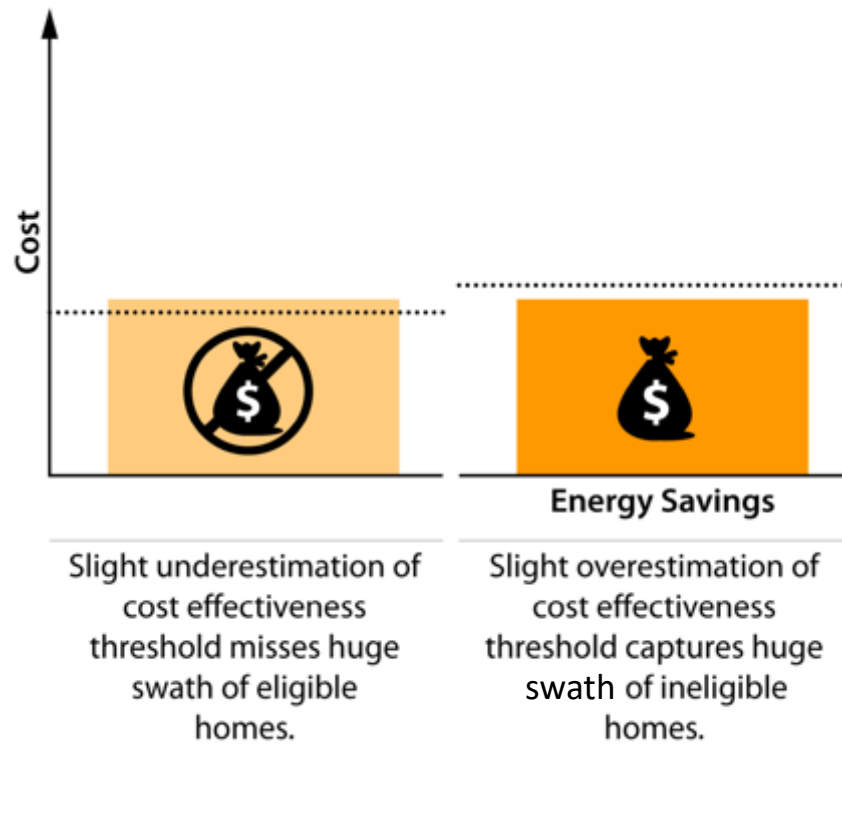
House icons by HAWRAF
via autodraw.com

Why is granularity important?

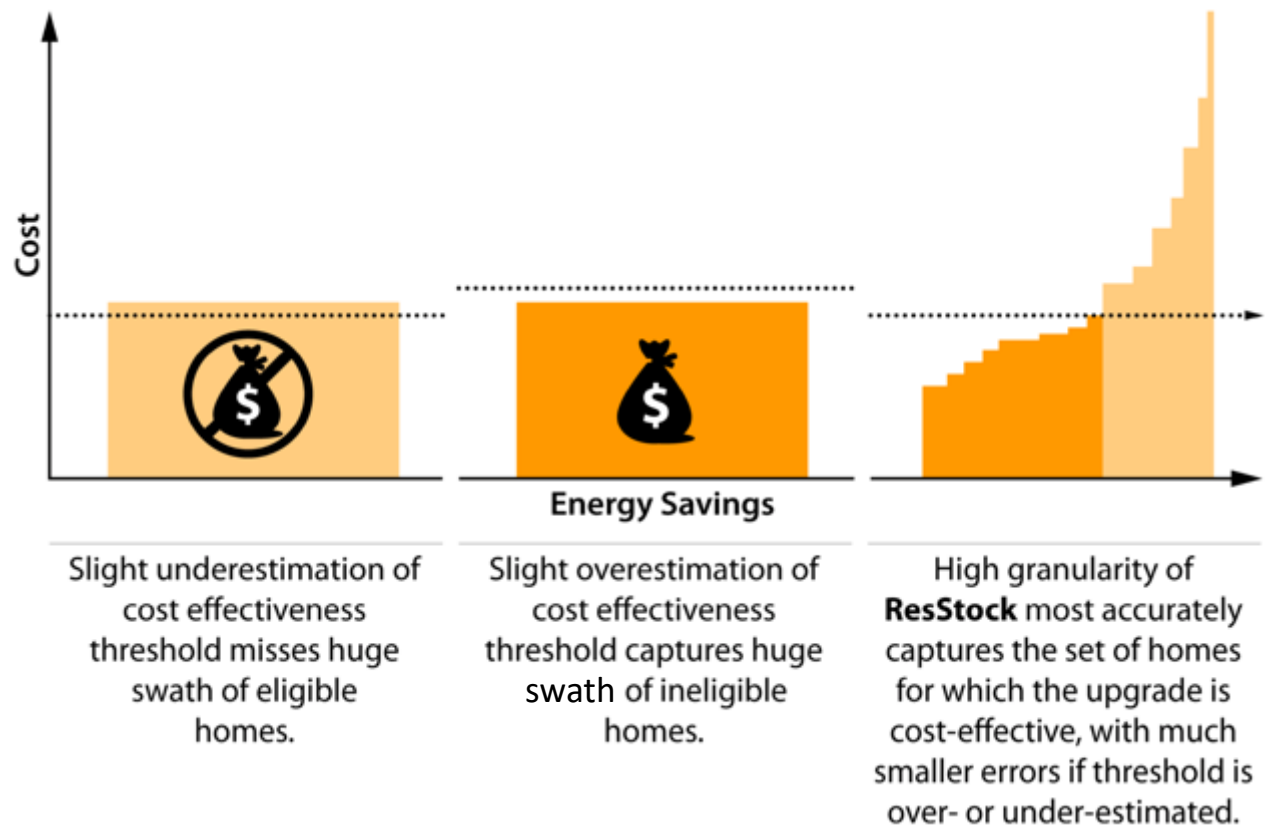


Slight underestimation of cost effectiveness threshold misses huge swath of eligible homes.

Why is granularity important?



Why is granularity important?



ResStock Applications

Users & research partners



EERE Building Technologies Office
EERE Office of Strategic Programs
Office of Policy
Office of Electricity



Bonneville
POWER ADMINISTRATION



NYSERDA



carbonswitch.co

Academic research collaborations



Los Angeles 100% Renewable Energy Study

Building load modeling



First-of-its-kind analysis

What role do buildings play in achieving
100% renewable energy for a city AND utility?



Projected to 2050

Los Angeles 100% Renewable Energy Study

Building load modeling



First-of-its-kind analysis

What role do buildings play in achieving 100% renewable energy for a city AND utility?



Growth

+



Electrification

+



Efficiency

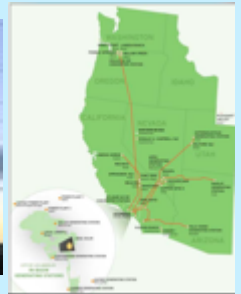
+



Flexibility

Projected to 2050

Electricity system modeling



Key study considerations

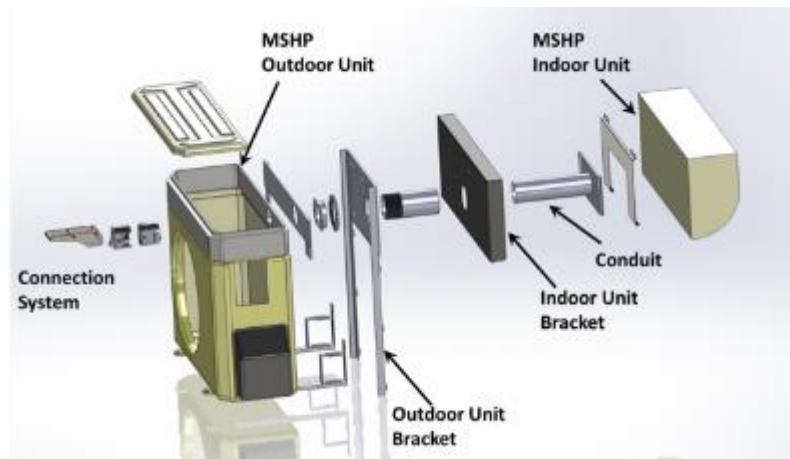
- Necessary grid infrastructure upgrades
- Critical transmission investments
- Maintaining system reliability
- Impact on equity, jobs, and local economy

Emerging Technology Analysis

for a Large Investor-Owned Utility in California

- Analysis to evaluate an innovative connection system for mini-split heat pumps
- Supports inclusion of the emerging technology in this large IOU's EE programs

EcoSnap-enabled mini-split heat pump



New article published in *Applied Energy* August 10, 2020

Impact of installation faults in air conditioners and heat pumps in single-family homes on U.S. energy usage

Link available at resstock.nrel.gov/page/publications

Highlights

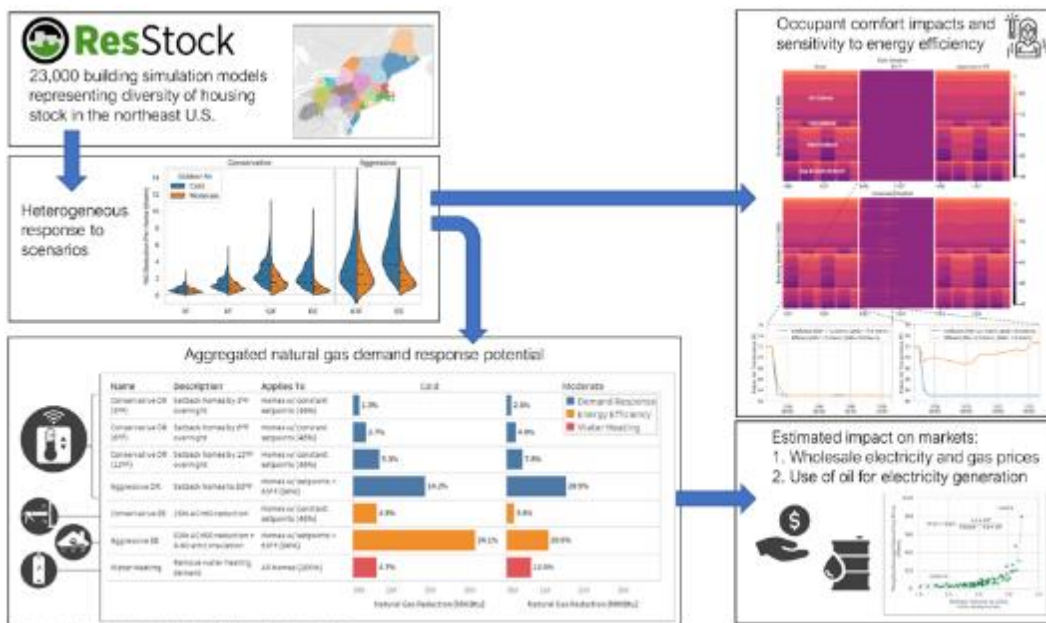
- Discuss impact of residential air conditioner and heat pump installation faults.
- Method to model indoor airflow and refrigerant charge faults in EnergyPlus.
- Conduct residential building stock simulations for U.S. single-family homes.
- Show a national energy impact of 20.7 TWh/y due to installation-related faults.



New article published in *Energies* October 5, 2020

Residential Natural Gas Demand Response Potential during Extreme Cold Events

Available at resstock.nrel.gov/page/publications



Article

Residential Natural Gas Demand Response Potential during Extreme Cold Events in Electricity-Gas Coupled Energy Systems

Andrew Speake ^{1,*}, Paul Donohoe-Vallitt ¹, Eric Wilson ², Emily Chen ² and Craig Christensen ¹

¹ National Renewable Energy Laboratory, Golden, CO 80401, USA; Eric.Wilson@nrel.gov (E.W.); cchristen@nrel.gov (C.C.)

² U.S. Department of Energy, Washington, DC 20585, USA; paul.donohoe-vallitt@doe.gov (P.D.-V.); emily.chen@doe.gov (E.C.)

* Correspondence: andrewspeake@nrel.gov

Received: 11 August 2020; Accepted: 25 September 2020; Published: 5 October 2020



Abstract: In regions where natural gas is used for both power generation and heating buildings, extreme cold weather events can place the electrical system under enormous stress and challenge the ability to meet residential heating and electric demands. Residential demand response has long been used in the power sector to curtail summer electric load, but these types of programs in general have not seen adoption in the natural gas sector during winter months. Natural gas demand response (NG-DR) has garnered interest given recent extreme cold weather events in the United States; however, the magnitude of savings and potential impacts—to occupants and energy markets—are not well understood. We present a case-study analysis of the technical potential for residential natural gas demand response in the northeast United States that utilizes diverse whole-building energy simulations and high-performance computing. Our results show that NG-DR applied to residential heating systems during extreme cold-weather conditions could reduce natural gas demand by 1–29% based on conservative and aggressive strategies, respectively. This indicates a potential to improve the resilience of gas and electric systems during stressful events, which we examine by estimating the impact on energy costs and electricity generation from natural gas. We also explore relationships between hourly indoor temperatures, demand response, and building envelope efficiency.

Keywords: demand response; building energy efficiency; energy resilience; building stock modeling; demand side management

1. Introduction

The coupling of recent cold weather events in the United States with increased utilization of natural gas for power generation has introduced unique challenges that strain the existing energy infrastructure. These challenges occur because extreme winter weather increases demand for natural gas and electric heating while also increasing the risk of failure of the energy system infrastructure during high wind, snow, and ice conditions. A natural gas thermostat demand response (NG-DR) program could provide increased flexibility and improve the resilience of natural gas and power supply during extreme winter events, by curbing demand at the residential building level. We present a demand-side approach to improving resiliency to meet peak winter demand, which ultimately complements the broader research addressing electric grid challenges during extreme weather [1–11].

In late January 2019, the Midwest and Mid-Atlantic regions of the country experienced record cold temperatures below -20°F (-28.9°C) because of a polar vortex event. The extreme cold resulted

Energies 2020, 13, 3002; doi:10.3390/ener13103002

www.mdpi.com/journal/energies

How to use ResStock

Access publications



Use the 48 State Factsheets and Data dashboard



Explore Baseline Characteristics and Results



Interactive Data Viewer

How to use ResStock

Access publications



Use the 48 State Factsheets and Data dashboard



Explore Baseline Characteristics and Results



Interactive Data Viewer

End-Use Load Profile Dataset & Viewer

Coming Fall 2021



How to use ResStock

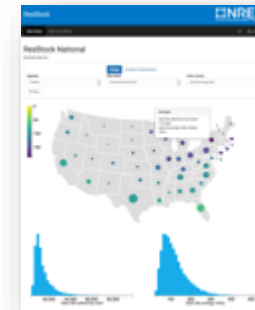
Access publications



Use the 48 State Factsheets and Data dashboard



Explore Baseline Characteristics and Results



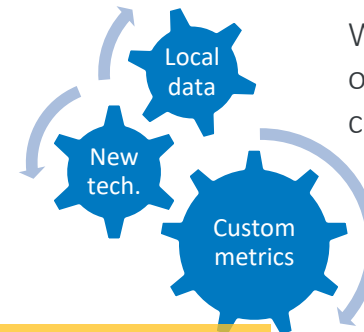
Interactive Data Viewer

End-Use Load Profile Dataset & Viewer

Coming Fall 2021



Analyze Your Custom Scenario



Work with NREL or other trained consultants

Visit resstock.nrel.gov to get started

Closing Poll

- **After today's call, what will you do?**
 - Consider implementing one or more of the ideas discussed
 - Seek out additional information on one or more of the ideas
 - Make no changes to your current approach
 - Other (please explain)

New Virtual Sessions from Solar Decathlon on Innovative Homes and Energy Careers

The Solar Decathlon announced a new webinar series starting in September that will include virtual tours of innovatively designed homes and address a variety of topics from the rise in zero energy homes to clean energy careers.



U.S. DEPARTMENT OF ENERGY

SOLAR DECATHLON

New Virtual Sessions from Solar Decathlon on Innovative Homes and Energy Careers

- **Discovering Clean Energy Careers**
Wednesday, October 14, 2020, 1–2 p.m. E.T.
Learn more about this webinar and [register here](#)
- **A Virtual Hands-On Energy Workshop for Families**
Wednesday, November 18, 2020, 1–2 p.m. E.T.
Learn more about this webinar and [register here](#)
- **Solar Student Leaders of Tomorrow Showcase**
Wednesday, December 16, 2020, 1–2 p.m. E.T.
Learn more about this webinar and [register here](#)
- **Resilient Home 411: Strategies to Weather and Recover from Natural Disasters**
Wednesday, January 20, 2021, 1–2 p.m. E.T.
Learn more about this webinar and [register here](#)
- **Zero Energy Ready Homes: New and Growing Fast**
Wednesday, February 17, 2021, 1–2 p.m. E.T.
Learn more about this webinar and [register here](#)
- **The Future of Solar: A Tour of Cutting-Edge Solar Research with the U.S. Department of Energy**
Wednesday, March 17, 2021, 1–2 p.m. E.T.
Learn more about this webinar and [register here](#)
- **Solar Decathlon Build Challenge Team House Tour**
Friday, April 16, 2021, 1–2 p.m. E.T.
Learn more about this webinar and [register here](#)
- **Winning Solar Home - The DOE Solar Decathlon Build Challenge Winners**
Wednesday, May 19, 2021, 1-2 p.m. E.T.
Learn more about this webinar and [register here](#)

Apply Today – DOE Announces \$80 Million 2020 BENEFIT Funding Opportunity

The U.S. Department of Energy [released](#) the Buildings Energy Efficiency Frontiers & Innovation Technologies (BENEFIT) 2020 Funding Opportunity Announcement (FOA). This funding opportunity will provide up to \$80 million for projects that enhance energy demand flexibility across buildings and the grid, enabling greater affordability, increased energy productivity, and improved occupant comfort.

The FOA includes topic areas on advanced building construction, workforce development, and a variety of building technologies, including advanced lighting, HVAC, and thermal energy storage, among others.

How to Apply

More information, submittal requirements, and instructions for applying to this FOA (DE-FOA-0002196) can be found on the EERE Exchange. To be eligible for consideration, a concept paper must be submitted no later than November 5, 2020 by 5:00 p.m. ET.

Questions about this FOA may be submitted to DE-FOA-0002196@netl.doe.gov no later than three business days before the application deadline.

Explore the Residential Program Solution Center

Resources to help improve your program and reach energy efficiency targets:

- [Handbooks](#) - explain *why* and *how* to implement specific stages of a program.
- [Quick Answers](#) - provide answers and resources for common questions.
- [Proven Practices](#) posts - include lessons learned, examples, and helpful tips from successful programs.
- [Technology Solutions](#) **NEW!** - present resources on advanced technologies, **HVAC & Heat Pump Water Heaters**, including installation guidance, marketing strategies, & potential savings.



<https://rpssc.energy.gov>

Thank You!

Follow us to plug into the latest Better Buildings news and updates!



[Better Buildings Twitter](#) with [#BBResNet](#)



[Better Buildings LinkedIn](#)



[Office of Energy Efficiency and Renewable Energy Facebook](#)

Please send any follow-up questions
or future call topic ideas to:
bbresidentialnetwork@ee.doe.gov